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ABSTRACT

Paired-associate learning efficiency was assessed within four low-SES ethnic populations (black, Chinese-American, Latino-American, and white) as a function of presentation conditions and method of measurement (verbal recall vs. pictorial recognition). A mixed-list paired-associate task was administered individually to 40 second grade children from each group. The results revealed substantial effects for presentation conditions, but not for populations. Nevertheless, the pattern of conditions effects differed as a function of both populations and measurement method. An explanation of the results was discussed in terms of the concept of differential memory coding as a function of specific subject characteristics. (References, tables, and figures are appended.) (Author)

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Elaboration and Learning Efficiency in Four Ethnic Groups[1,2,3]

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Abstract

Paired-associate learning efficiency was assessed within four low-SES ethnic populations (black, Chinese-American, Latino-American, & white) as a function of presentation conditions and method of measurement (verbal recall vs. pictorial recognition). A mixed-list paired-associate task was administered individually to forty second grade children from each group. The results revealed substantial effects for presentation conditions, but not for populations. Nevertheless, the pattern of conditions effects differed as a function of both populations and measurement method. An explanation of the results was discussed in terms of the concept of differential memory coding as a function of specific subject characteristics.

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[3]A paper presented at the annual meeting of the American Educational Research Association, April 3-7, 1972 Chicago, Illinois.

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RE004 128

Elaboration and Learning Efficiency in Four Ethnic Groups

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Research to date shows that the basic learning ability of young children from different ethnic groups, as indexed by the method of paired-associates (PA), is not different (Jensen, 1961; Rohwer, 1969; Semler & Iscoe, 1963). Current research evidence also demonstrates the unequivocal relationship between elaboration and learning efficiency (Rohwer, 1970). For example, noun pair learning is facilitated when the nouns to be learned are embedded in preposition strings as opposed to nouns presented in conjunction strings or when the noun referents are depicted in a spatial-interactive picture relative to a picture of the noun referents depicted side by side (Davidson & Adams, 1971). The target populations for elaborative PA learning research among different ethnic groups have been primarily low social-economic-status (SES) black and high SES white school children (Rohwer, 1967; Rohwer, Ammon, Suzuki, & Levin, 1971). The purposeful confounding of SES and ethnicity by Rohwer has served to illustrate both the equivalent levels of learning ability and the capacity of each group to benefit from experimenter provided aural-verbal and visual-pictorial elaboration.

The present experiment was performed in order to investigate learning efficiency within each of four different ethnic groups of equivalent SES: black and white children previously contrasted by Rohwer et al., Chinese-American, and Latino-American. The results from the present study will

in part explicate the previous results of Rohwer et al., where SES and ethnicity were confounded and provide an empirical characterization of efficient learning conditions within each of the four ethnic groups as a function of elaboration mode.

The method by which learning efficiency is measured is an important variable in the present experiment. Children from both the Chinese and Latino populations are bilingual; English is a second language. Also, the black children are dialect speakers of standard English. The verbal recall of English labels for correctly learned PAs may confound learning ability with a child's standard English language skills. Previous research indicates that facilitation of PA learning is detected in both verbal recall and pictorial recognition (Kee & Rohwer, 1970), and equivalent degrees of learning are observed for both aural-verbal and visual-pictorial elaboration (Kee, Guy, & Rohwer, 1971). Therefore, a response mode comparison in the present experiment is both methodologically important and theoretically significant. The pictorial recognition measure should provide for an accurate index of learning efficiency on the one hand, while the response mode contrast with verbal recall will provide for the assessment of potential output interference.

Provisions in the present experiment have also been made to allow for the assessment of the number of PAs retained as well as the number initially learned and to measure the child's ability to benefit from practice on a prior PA list, i.e., non-specific transfer.

Thus the experiment is addressed to five specific problems: 1) the juxtaposition of four low-SES ethnic groups in paired-associate learning; 2) the characterization of efficient conditions for elaboration within each ethnic population; 3) the comparison of verbal recall and pictorial

recognition as indices of learning efficiency; 4) evaluation of retention; and 5) assessment of learning to learn.

Method

Subjects. A total sample of 160 second grade children served as subjects. Each of four low-SES communities in San Francisco, California, known for their ethnic homogenity of school population, contributed twenty boys and twenty girls. Identification of schools representing a homogeneous sample of each ethnic group was based on San Francisco Unified School District Student Census Data (1969). Classification in terms of SES was determined on the basis of census tract information in which households were clearly classifiable in terms of SES. The procedure focused on the following variables: median income, median educational level, percent homeowners, average value of homeowners dwelling, average rent, ratio of "deteriorating" and dilapidated houses to sound, and a crowding index. Subjects from each ethnic group were assigned to treatment conditions at random.

Task and Materials. Two twenty-five-item paired-associate lists were constructed. The pictorial material consisted of line drawings of familiar objects (e.g., a ship, a lamp, a cow, etc.) selected from first and second grade primer reading books. The items in each list were presented in one of five different ways. The item types were distinguished from one another in terms of both aural-verbal and visual-pictorial features. The five item types are described below:

1. Unjoined Pictures (∂): pictures of two objects depicted side by side; no aural-verbal identification.

2. Unjoined Pictures-Noun Lables (∂L): Identical to #1, but with the accompanying verbal label presented aurally, e.g., "the pencil, the cake"

3. Unjoined Pictures-Preposition Strings (JP): Identical to #1, but with accompanying prepositional string presented aurally, e.g., "the pencil through the cake".

4. Joined Picture-Noun Label (JL): pictures of the two objects depicted in a spatial-interactive setting, e.g., a picture of a pencil stuck through the center of a cake, and accompanying verbal labels presented aurally.

5. Joined Picture-Preposition Strings (JP): Identical to #4, but with accompanying aurally presented prepositional string.

In order to permit unequivocal attribution of the expected differences between item types, corresponding to differences between the presentation modes, each item type was counter-balanced by five item sets within each list to provide for equal distribution of item difficulty among the item types.

The line drawings of the objects were photographed on videotape with a pre-recorded sound track of a male voice supplying aural-verbal identification and elaboration in the appropriate conditions. These materials were presented to Ss via a videotape playback system.

In addition, on test trials, Ss in recognition conditions were supplied with a response booklet containing one page of distractors for each test item. Each page was comprised of four rows of five objects, nineteen within list distractors plus the correct response. The correct response appeared an equal number of times in each position on the page and each object appeared an equal number of times throughout the booklet as a response distractor. There were twenty-five randomly ordered pages for each of the two test trials and two lists. A third set, constructed in the manner just described, was included for the test of first list retention. Each set of twenty-five was constructed independently.

Procedure. Subjects were examined individually, a two trial study test method was used for each list. The rate of presentation was four

seconds for study trials and ten seconds for test trials. When a S entered the room, he was seated behind a small desk on which a TV monitor was located. Instructions specific to the response mode conditions were administered. In all conditions, the S was informed that he would see twenty-five pairs of objects and hear their names, and that he was to learn them in such a way as to be able to produce the name or recognize a picture of one pair member when presented with the other. All study trial materials were presented via the TV monitor as were the stimulus items during the test trial. In recall subjects responded verbally, while in recognition they chose the correct item from a page of distractors by a pointing response. Second list learning was initiated immediately after first list learning. Subjects were tested for first list retention at the completion of second list learning. Five practice items, representing the five item types, preceded the administration of the first list.

Design. The basic design consisted of a 2 x 2 x 4 nested factorial, with subject's sex (male vs. female) nested within response mode (recall vs. recognition), which in turn was nested within ethnicity (black, Chinese-American, Latino-American, and white). The order of list presentation was counterbalanced within the design.

The design was augmented to permit the assessment of a number of within S sources of variance: item type planned comparisons, trials (2 - 1), practice (second list recall minus first list recall), and their respective higher order interactions nested within response mode, all of which was nested within ethnicity. For this purpose orthorgonal linear transformations of the original twenty item type x trial x list variates were made creating nineteen new variables representing the appropriate within S sources of variance. The four planned comparisons, constructed to permit specific

assessment of the expected pattern of conditions effects, are the following:

$$\hat{\psi}_1 = \text{ƒL} - \text{ƒ}$$

$$\hat{\psi}_2 = \text{JL} - \text{ƒP}$$

$$\hat{\psi}_3 = (\text{JL} + \text{ƒP})/2 - \text{JP}$$

$$\hat{\psi}_4 = (\text{JL} + \text{ƒP} + \text{JP})/3 - (\text{ƒ} + \text{ƒL})/2$$

The first comparison, $\hat{\psi}_1$, provides a test for the predicted learning improvement attached to labeling unjoined picture presentation. The second, $\hat{\psi}_2$, tests the relative efficiency of aural-verbal vs. visual-pictorial modes of elaboration. Comparison three, $\hat{\psi}_3$, contrasts the superiority of joint elaboration to elaboration in a single mode. The final comparison, $\hat{\psi}_4$, is a test of the superiority of elaboration per se to non-elaboration in the learning of PAs.

Results

The dependent variable for the assessment of between S sources of variance was the total number correct across two trials and two lists. Neither the main effect associated with ethnicity, F (3, 144) = .88, $p > .05$, nor response mode nested within ethnicity was significant: black, F (1, 144) = .41; Chinese-American, F (1, 144) = 2.70; Latino-American, F (1, 144) = 1.24, and whites, F (1, 144) = 1.59, $p > .05$. No significant sex differences were detected within response mode, nested within ethnicity, $p > .05$, with the exception of sex nested within recognition for the Chinese-Americans, which revealed that the boys' performance was significantly higher than the girls', F (1, 144) = 4.41, $p < .05$.

As previously mentioned, analysis of specific within S sources of variance representing the four planned comparisons, trials, practice, and their higher order interactions were conducted on the appropriate set of dependent variables constructed from the linear transformation of the original twenty item x trial x list variates. The following procedure was used for all multivariate tests: a) an over-all multivariate test for the equality of mean vectors was made ($\alpha = .05$); and b) independent univariate tests on each dependent variable within the set were conducted (e.g., for each item type planned comparison); however, rejection of the null hypothesis for each univariate test was only allowed if the multivariate test was significant. The type 1 error rate for each univariate test was set equal to $\alpha = .01$.

The means for each item type across response modes and within ethnic group are presented in Figure 1 and Figure 2. The results of the multivariate analysis performed on the planned comparisons demonstrated significant patterns of facilitated learning within each of the eight levels represented by the double nesting within response mode and ethnicity, $p < .05$. The results of the univariate analysis performed on each item type comparison nested within response mode, all of which were nested within ethnicity, are summarized in Table 1.

Insert Figures 1 & 2 about here

Insert Table 1 about here

Black Children. The first comparison, $\hat{\psi}_1$, revealed the expected increase in performance associated with the labeling of unjoined pictures in both recall and recognition. A superiority for visual-pictorial elaboration relative to aural-verbal was detected in recognition, $\hat{\psi}_2$; the trend in recall, while in the same direction, was not significant. Joint elaboration, $\hat{\psi}_3$, was superior to elaboration in a single mode in both response modes. The expected superiority of the combination of elaboration conditions vs. the non-elaboration conditions, $\hat{\psi}_4$, was also significant in both recall and recognition.

Chinese-American Children. Consistent with the findings for the black children, $\hat{\psi}_1$, significantly improved learning was demonstrated in both recall and recognition as a function of labeling unjoined picture PAs. Superiority of visual-pictorial to aural-verbal elaboration, $\hat{\psi}_2$, was only detected in recall; equivalent levels of performance were observed in recognition. The predicted superiority of joint elaboration to elaboration in a single mode, $\hat{\psi}_3$, was only confirmed in recognition. The trend in recall, while not significant, was in the same direction. Again, $\hat{\psi}_4$, demonstrates the facilitating effects of elaboration on PA learning regardless of response method used to index learning, in this case with a sample of second grade Chinese-American children.

Latino-American Children. The first comparison, $\hat{\psi}_1$, confirmed the predicted superiority of labeled unjoined pictures to unjoined pictures in recall, whereas, the difference in recognition, while in the predicted direction was not significant. The test of elaboration efficiency, $\hat{\psi}_2$, revealed superiority of visual-pictorial to aural-verbal in recall, while equivalent performance was observed in recognition. Joint elaboration benefits, $\hat{\psi}_3$, were detected only in recognition. Again, the trend in

recall, while in the same direction was not significant. As previously demonstrated for the black and Chinese-American children, elaboration per se has a potent facilitating effect on noun pair learning relative to non-elaboration in PA, $\hat{\psi}_4$, in both recall and recognition.

White Children. The benefits attached to labeling unjoined pictures, $\hat{\psi}_1$, previously observed for the other ethnic groups were also detected for the white children in both recall and recognition. Superiority of visual-pictorial to aural-verbal elaboration, $\hat{\psi}_2$, was only detected in recognition; equivalent degrees of performance were observed in recall. Joint elaboration superiority, $\hat{\psi}_3$, was demonstrated in recall, while the identical trend in recognition was not significant. The final comparison, $\hat{\psi}_4$, confirmed the prediction in both recall and recognition, that is, elaborative PA performance would be superior to performance on non-elaborative PAs.

It is interesting to note that the pattern of facilitated learning for both the Chinese-American and Latino-American children (i.e., $\hat{\psi}_2$, & $\hat{\psi}_3$) are identical and divergent from the trend observed for the black and white children. The former two groups are bilingual. The black children, who demonstrated the most consistent pattern of facilitation across response modes was the only population that has been previously investigated.

Finally, significant gains over trials were detected in both recall and recognition for each ethnic population, $p < .05$. Interactions involving trials, item type comparison, and S's sex were observed, but followed no consistent pattern.

Learning to Learn. It will be recalled that provisions were made to test the effects of non-specific transfer (i.e., practice) on PA learning.

All ethnic groups in the present study demonstrated significant gain between first and second list learning ($p < .05$); the one exception being the recall condition nested within the black population where first and second list performance was equivalent. However, a significant trials x practice interaction revealed learning to learn effects for the first trial, F (1, 144) = 5.66, $p < .05$.

Retention. The efficiency of recall and recognition in short term retention was indexed by the amount lost between the second test trial of original learning and the first list retention test. Analysis of the loss scores reflects primarily retention rather than degree of original learning. Table 2 presents the mean number lost for each item type across

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Insert Table 2 about here

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response modes, within ethnic population. The results of the retention analysis shows no differential loss associated with the between group factors of ethnicity, response mode nested within ethnicity, or sex nested within the eight levels of response mode x ethnicity, $p > .05$. Multivariate analysis conducted on the four item type planned comparisons nested within response mode, all of which were nested within ethnicity, revealed no differential forgetting, $p > .05$. Nor were significant effects associated with the interaction of sex and the item type comparisons at any of the eight levels of response mode x ethnicity, $p > .05$.

Discussion

The purpose of the present experiment was to evaluate and characterize the effects of elaboration on PA learning efficiency within each of four

low SES ethnic populations of second grade children. The findings regarding three of the five problems addressed are unequivocal: 1) all ethnic groups showed substantially improved PA learning as a function of either aural-verbal or visual-pictorial elaboration regardless of the response method used to index learning, i.e., verbal recall or pictorial recognition; 2) significant learning-to-learn effects emerged in each group; and 3) no difference in forgetting was detected between groups.

With respect to elaborative PA learning research where ethnicity has been confounded with SES (Rohwer, et al), the equivalent mean levels of performance observed in the present experiment between four ethnic populations of equivalent SES suggest that ethnicity is not a significant factor affecting overall PA performance. However, the present design lacked the necessary control populations (i.e., high SES samples) in order to properly resolve the issue. In addition, caution should be exercised in prematurely concluding that SES per se is responsible where population differences are detected (e.g., Rohwer's et al kindergarten sample) in view of the evidence of equivalent PA learning performance reported for children from high and low strata schools (Rohwer, Lynch, Levin, & Suzuki, 1968). Therefore, the issue awaits explication in an experiment which factorially investigates both SES and ethnicity in elaborative PA learning.

The provocative nature of the present results concerns the characterization of efficient elaboration conditions for each ethnic group as a function of response mode. As mentioned in the results, diverse patterns of facilitation were observed. One tentative interpretation of this finding is proposed in terms of differential memory coding. Current theoretical notions posit two primary memory process codes, i.e., a verbal and a visual-imagery code (Paivio, 1969). The codes function either

alternately or in a coordinate-interconnected fashion (Bower, 1971). In the present experiment, presented PAs are potentially coded in one of three ways by the S: 1)verbally; 2) visual-imagery; and 3) coordinate verbal and imagery codes. Differential coding is determined by both task and subject variables (Levin, Rohwer, & Cleary, 1971; Mallory, 1971;). The subject variables of language ability and S coding preference and their subsequent interaction with the presentation mode of elaboration are identified in the present analysis as determinants of differential memory coding. Thus, interpretation of the present findings for each ethnic population are explicated in these terms.

Bilingual Children. An account of the differential facilitation observed for the Chinese-American and Latino-American children can be given in terms of a hypothesis which draws on the notions of multiple verbal memory codes, response competition, and output interference. For the bilinguals, visual-pictorial elaboration prompts imagery coding which is sufficient for efficient learning. However, aural-verbal elaborated PAs require multiple codes (e.g., an English verbal code, a translated native language code, and the elicited imagery codes) for efficient learning. In addition these memory codes may not be semantically identical (Ervin & Osgood, 1954; Weinreich, 1954). In the pictorial recognition response measure, where decoding is not a factor, equivalent degrees of learning performance is demonstrated between visual-pictorial and aural-verbal elaborated PAs, since the S can easily identify the correct response from an imagery code and match it to the corresponding response distractor. However, in recall where retrieval and decoding are necessary, differential performance is observed. The S encounters no difficulty in decoding a verbal label from imagery for items presented in visual-pictorial elaborative conditions, but performance is surpressed for aural-verbal elaborative

items due to output interference encountered as a function of verbal code competition (i.e., between English and native language codes) during retrieval and response competition during decoding.

A prediction from this hypothesis for the two bilingual populations within the present design regards performance where the analogs to multiple codes are experimentally provided (i.e., joint elaboration - JP). Based on the assumption that joint elaboration prompts multiple coding, and that multiple codes should enhance learning relative to uni-coding (Paivio, 1969), the superiority of joint elaboration relative to elaboration in a single mode should be observed in recognition. However, multiple codes in recall would be expected to produce an artificial ceiling effect on performance due to output interference as a function of verbal code and response competition. Therefore, equivalent degrees of performance should be observed between the two methods of elaboration (i.e., single mode vs. joint). This present prediction was confirmed in the pattern of facilitation observed for both the Chinese-American and Latino-American Ss. An interesting experiment is suggested by the above analysis in which response measure (English recall vs. native language recall vs. pictorial recognition) is nested within language mode of aural-verbal elaboration (Standard English vs. S's native language, e.g. Chinese). Predictions in accord with the hypothesis suggest that within English elaboration, recognition superiority to both recall English and recall native should be detected, whereas no difference between the two recall methods will be detected. In native language elaboration, however, recognition and recall native should be equivalent and both should be superior to recall English. A visual-pictorial elaboration control condition should demonstrate no differences between response measures. These predictions, if confirmed, would support the differential multiple coding and interference notions proposed for bilinguals. In addition, the findings would demonstrate that both visual-pictorial and aural-verbal elaboration in a S's

native language are superior to aural-verbal elaboration in a S's second language in prompting efficient learning.

Black Children. The results for the black children indicate that both verbal recall and pictorial recognition measure the same degree of learning as a function of elaboration method. The response mode contrast offers no evidence regarding the notion of functional output interference as a function of the black child's dialect. This conclusion is consistent with the results of an experiment reported by Kusch (1969), who compared standard vs. lenient PA scoring techniques. Whereas performance improved for both low SES black Ss and high SES white Ss with the lenient method, which allowed transformations (e.g., synonyms, superordinate class members, etc.) on the original response term to be scored correct, the pattern of facilitated learning as a function of elaboration method was not altered.

The order of facilitated learning as a function of elaboration method (i.e., JP < JL < JP) observed in the present experiment suggests that memory coding for black children is restricted to the presentation mode analog which presents the most efficient information for learning. Since picture PAs are more efficient for learning than aurally presented PAs (Levin, Rohwer, & Cleary, 1971), imagery coding prompted by visual-pictorial elaboration is superior to verbal coding prompted by aural-verbal elaboration. Futhermore, since PAs elaborated in both presentation modes are more efficient for learning than PAs elaborated in one mode (Davidson & Adams, 1970), dual coding prompted by joint elaboration facilitates learning relative to uni-coding as a function of either aural-verbal or visual-pictorial elaboration in PA learning.

White Children. The pattern of facilitated learning displayed by the white children is unique in contrast to both previous research and the other ethnic populations investigated. The white children demonstrated more visual-pictorial elaborative facilitation relative to aural-verbal in recognition, whereas previous research reports either equivalent performance (Kee, et al), or more aural-verbal facilitation relative to visual-pictorial in recognition (Davidson & Adams, 1970; Kee & Rohwer, 1970). It should be noted that there are both methodological task (i.e., test time interval, number of recognition response distractors, and within S vs. between S design) and subject (i.e., SES) differences between the experiments. The possible significance of these discrepant features is unknown. Thus, this discrepancy is a mystery and unexplained at present.

A tentative explanation of the white children's elaborative performance, consistent with the theme of differential memory coding, can be given in terms of an hypothesis drawing on the notions of differential response mode sensitivity and verbal memory code preference. No differences for Ss in recall are detected between the two methods of elaboration since Ss are relying primarily on a verbal memory code for efficient performance. When presented with visual-pictorial elaborated PAs, the S spontaneously codes verbally; the residual imagery information, though stored, is below recall threshold. On the other hand, the observed facilitation of visual-pictorial performance in recognition is due to the sensitivity of the pictorial recognition measure to both the verbal code and the residual imagery code. The present hypothesis predicts that joint elaboration should exert a greater effect in recall opposed to recognition when compared to visual-pictorial elaboration, presumably since recognition already indexes the dual memory code (i.e., verbal and imagery) prompted

by visual-pictorial elaboration of PAs. In addition, joint elaboration should be superior to aural-verbal elaboration in both recall and recognition, since an additional imagery code is now available for efficient performance. Though these specific tests were not made, inspection of the means in Figure 2, bears out the predicted trends in the data.

The foregoing analysis for each ethnic group is tentative at best. The unique pattern of facilitated learning as a function of elaboration and response mode for each group is complementary to the findings of Lesser, Fifer, & Clark (1965) who observed different patterns of mental abilities for Black, Puerto Rican, Chinese, and Jewish second grade school children. However, replication of the present findings and empirical explication of the effects of specific S variables (e.g., bilingualism) on the pattern of facilitated learning observed is advocated in lieu of a premature conclusion that ethnicity also fosters different learning patterns.

In summary, the present study was conducted to investigate elaboration and PA learning efficiency in four low-SES ethnic populations. The results revealed substantial facilitated learning as a function of aural-verbal and visual-pictorial elaboration; the populations however, differed markedly relative to the mode of efficient elaboration when verbal recall was contrasted to pictorial recognition. An explanation of the results was proposed in terms of the concept of differential memory coding as a function of specific subject characteristics.

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TABLE 1

Results of the Univariate Analysis for the Item Type Planned Comparisons as a Function of Response Mode and Ethnicity

	RECALL		RECOGNITION	
Source	df	F-ratio	df	F-ratio
Black				
$\hat{\psi}_1$	1, 144	15.07*	1, 144	10.92*
$\hat{\psi}_2$	1, 144	3.59	1, 144	7.04*
$\hat{\psi}_3$	1, 144	10.99*	1, 144	22.19*
$\hat{\psi}_4$	1, 144	114.04*	1, 144	103.60*
Chinese-American				
$\hat{\psi}_1$	1, 144	13.21*	1, 144	7.43*
$\hat{\psi}_2$	1, 144	10.39*	1, 144	.48
$\hat{\psi}_3$	1, 144	2.33	1, 144	18.64*
$\hat{\psi}_4$	1, 144	116.47*	1, 144	141.01*
Latino-American				
$\hat{\psi}_1$	1, 144	19.89*	1, 144	2.46
$\hat{\psi}_2$	1, 144	5.77*	1, 144	.48
$\hat{\psi}_3$	1, 144	2.74	1, 144	10.70*
$\hat{\psi}_4$	1, 144	138.33	1, 144	131.95*
White				
$\hat{\psi}_1$	1, 144	25.38*	1, 144	7.89*
$\hat{\psi}_2$	1, 144	0.0	1, 144	8.85*
$\hat{\psi}_3$	1, 144	20.57*	1, 144	3.04
$\hat{\psi}_4$	1, 144	137.20*	1, 144	115.08*

*$p < .01$

TABLE 2

Mean Number Lost as a function of
Ethnicity, Response Mode, and Item Type

Ethnic Population	Response Mode: Recall					Response Mode: Recognition				
	J	JL	JP	JL	JP	J	JL	JP	JL	JP
Black	.30	.40	.30	.25	.25	-.10	.25	.25	.10	.20
Chinese-American	.05	0.00	.20	.60	.20	-.05	.30	.25	.10	-.20
Latino-American	.25	.35	.25	.35	.10	.35	.45	0.00	-.10	.40
White	.15	.40	.15	-.35	.25	.25	.40	.25	.40	.25

Item Types:
- J Unjoined Pictures
- JL Unjoined Pictures with Labels
- JP Unjoined Pictures with Preposition Strings
- JL Joined Pictures with Labels
- JP Joined Pictures with Preposition Strings

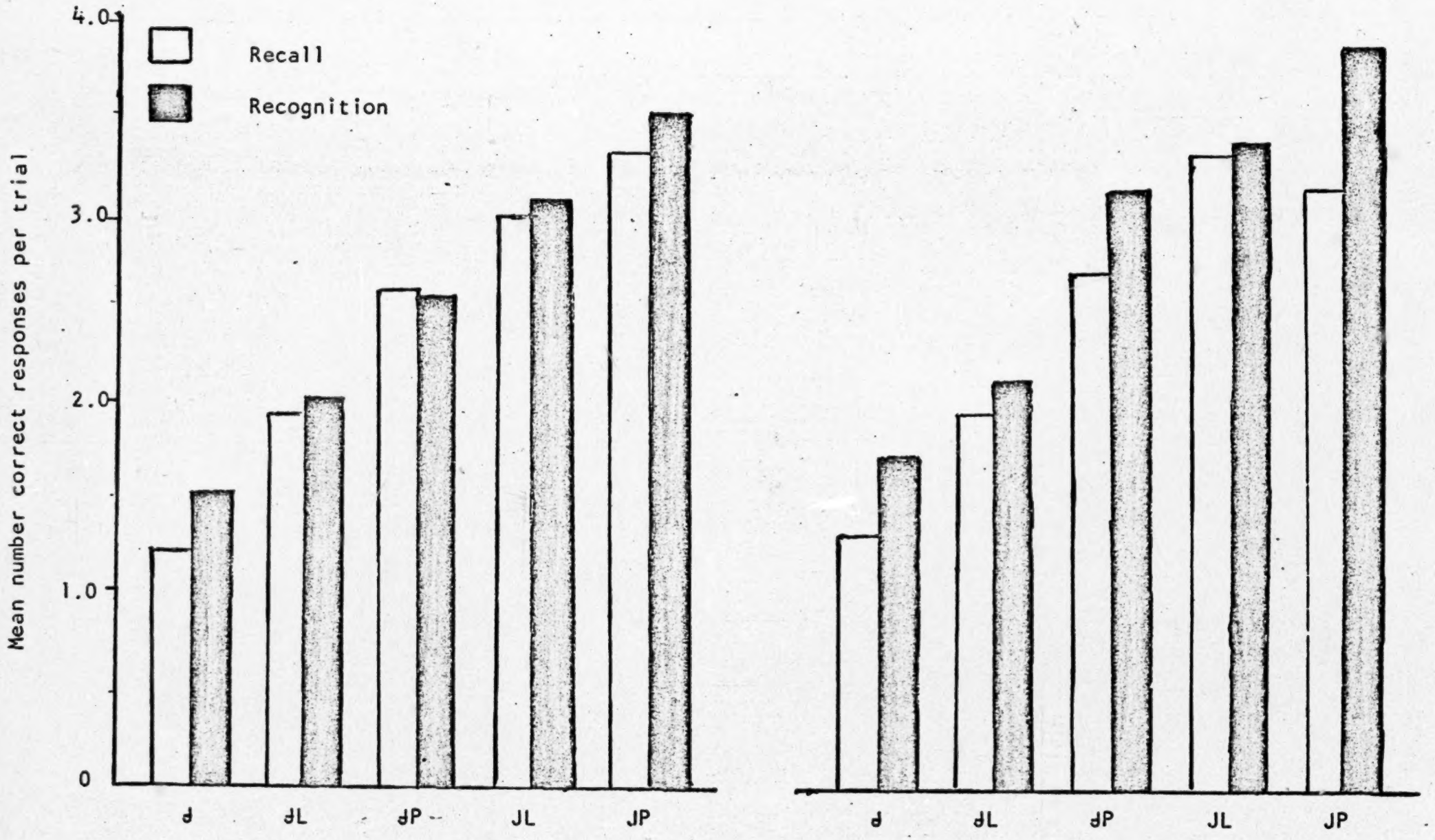

Figure 1. Mean Number of Correct Responses as a Function of Ethnicity, Response Mode, and Item Type

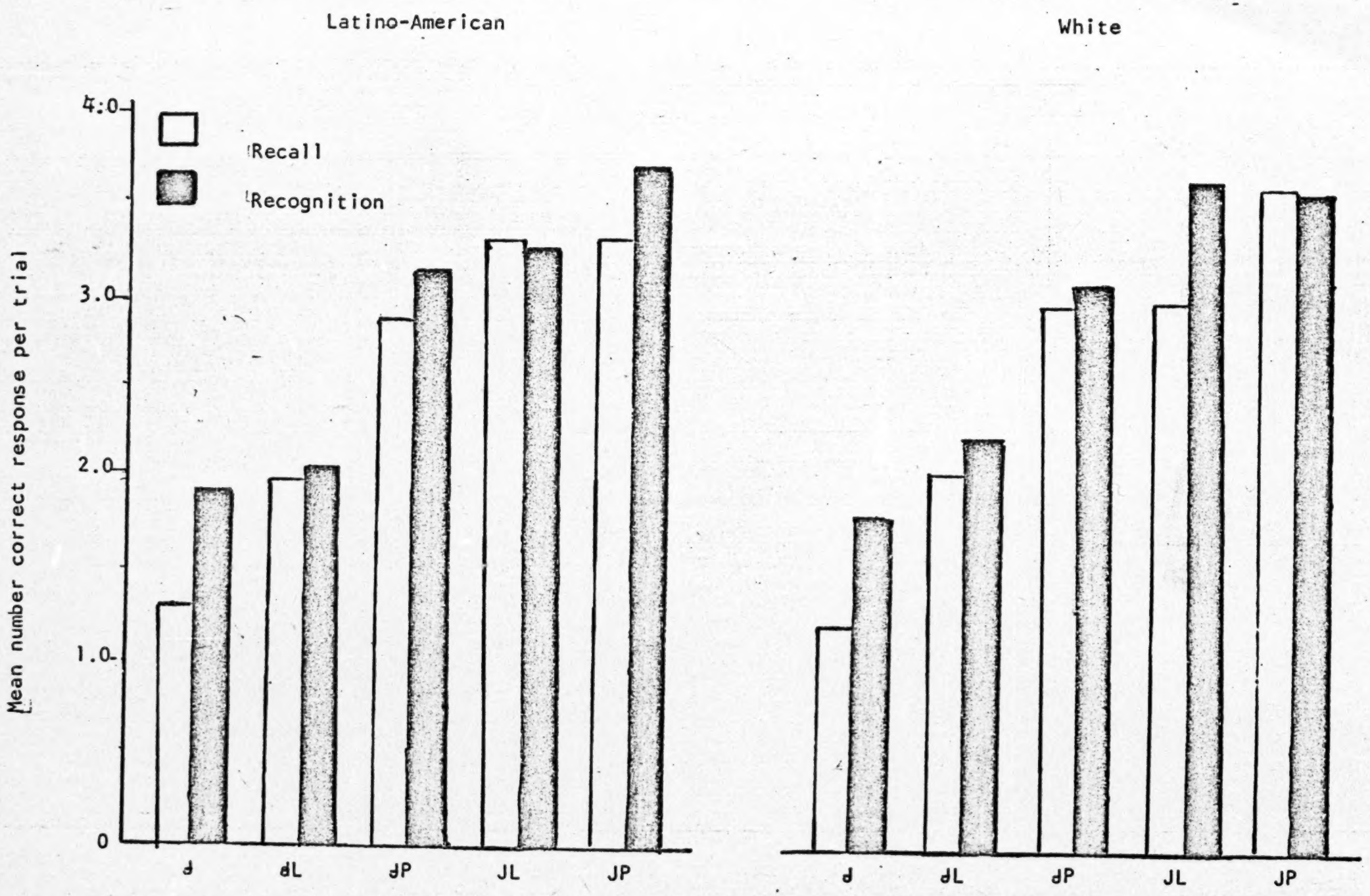

Figure 2. Mean Number of Correct Responses as a Function of Ethnicity, Response Mode, and Item Type